

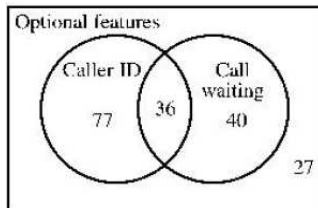
Venn Diagrams #1

1. Draw a Venn diagram for the given sets. In words, explain why you drew one set as a subset of the other, disjoint sets, or overlapping sets.

a) beverages and soft drinks

b) fish and birds

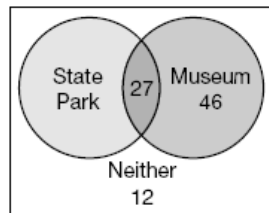
2.



The following Venn diagram describes the optional features ordered by new telephone customers in a certain region. Use it to determine how many customers did not order Caller ID.

How many ordered Call Waiting but not Caller ID?

3.



The freshman science classes were surveyed to see whether they wanted to visit the local natural history museum or a nearby state park. They could choose the museum, the park, both, or neither. The results of the survey are shown in the Venn diagram at the right. If 96 students were surveyed, how many wanted to go only to the state park?

For the following problems, draw a Venn diagram then solve.

4. In a class of 50 students, 18 take Chorus, 26 take Band, and 2 take both Chorus and Band. How many students in the class are not enrolled in either Chorus or Band?

5. At State U, all first-year students must take chemistry and math. Suppose 15% fail chemistry, 12% fail math, and 5% fail both. Suppose a first-year student is selected at random. What is the probability that student selected failed at least one of the courses?

6. Suppose that you have torn a tendon and are facing surgery to repair it. The orthopedic surgeon explains the risks to you. Infection occurs in 3% of such operations, the repair fails in 14%, and both infection and failure occur together in 1%. What percent of these operations succeed and are free from infection?

7. Mary has applied to both Auburn University and the University of Georgia. She thinks the probability that Auburn will admit her is 0.6, the probability that Georgia will admit her is 0.3, and the probability that both will admit her is 0.2.

a. What is the probability that neither university admits Mary?

b. What is the probability that she gets into Georgia but not Auburn?

8. Researchers are interested in the relationship between cigarette smoking and lung cancer. Suppose an adult male is randomly selected from a particular population. Set up a Venn diagram given that the following table shows some probabilities involving the compound event that the individual does or does not smoke and the person is or is not diagnosed with cancer:

<u>Event</u>	<u>Probability</u>
smokes and gets cancer	.08
smokes and does not get cancer	.22
does not smoke and gets cancer	.04
does not smoke and does not get cancer	.66

9. Suppose that for a group of consumers, the probability of eating pretzels is .75 and that the probability of drinking Coke is .65. Further suppose that the probability of eating pretzels and drinking Coke is .55. Determine the probability of not drinking Coke and not eating a pretzel.

10. A big company has 10 receptionists all of whom can speak English. Among them, there are 4 receptionists who can also speak Spanish, there are 2 who can also speak Chinese and there is only one who can also speak both Spanish and Chinese. Besides English, Spanish and Chinese, no other language is known to any of the receptionists. If you call up the reception desk of this company and all receptionists are equally likely to pick up the phone, what is the probability that you would be talking with a receptionist who can speak at least two languages?

11. In a certain group of 100 customers at Phil's Pizza Palace, 60 customers ordered cheese and pepperoni on their pizza. Altogether 80 customers ordered a pizza with cheese on it and 72 customers ordered pizza with pepperoni on it.

a. How many customers ordered cheese on their pizza, but no pepperoni?

b. How many customers ordered pepperoni on their pizza, but no cheese?

c. How many customers in the group of 100 customers did not order either type of pizza?

12. In a school of 320 students, 85 students are in the band, 200 students are on sports teams, and 60 students participate in both activities. How many students are involved in either band or sports?

13. Out of forty students, 14 are taking English Composition and 29 are taking Chemistry. If five students are in both classes, how many students are in neither class? How many are in either class? What is the probability that a randomly-chosen student from this group is taking only the Chemistry class?

14. A poll of 2,000 students revealed: 554 respondents only watch TV. They do not browse the Web while they watch. 1,200 respondents only use the Internet. The TV is not on while they're browsing. If all 2,000 people watch tv or use the internet, how many people watch TV and browse the Web at the same time?

15. A survey of 1,200 college students reveals that $\frac{3}{4}$ have a profile on MySpace, $\frac{3}{4}$ have a profile on Facebook, and $\frac{1}{2}$ have a profile on both sites.

a. How many students have a profile on MySpace? (Whole number, not a percentage).

b. How many students have a profile on Facebook? (Whole number, not a percentage).

c. How many students have a profile on both sites? (Whole number, not a percentage).

16. In a recent poll of 400 registered voters, 40% said they have always been a Republican, 42% said they have always been a Democrat, and the remaining respondents said they have switched from one party to another at some point in their lives.

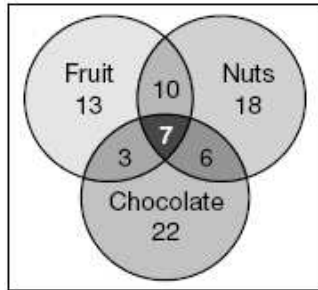
a. How many people said they have always been a Republican? (This must be a whole number, not a percentage).

b. How many people said they have always been a Democrat? (Whole number, not a percentage).

c. How many people have switched parties? (Show both the percentage and the whole number).

Venn Diagrams #2

1.



The Venn diagram shows the three types of food ingredients students picked as things they like in a dessert: nuts, fruit, and chocolate.

a. How many students like desserts with only nuts and chocolate?

b. How many students would like a combination of all three ingredients in a dessert?

c. How many students like only desserts with nuts?

d. How many students were polled in the survey?

2. 100 people seated at different tables in a Mexican restaurant were asked if their party had ordered any of the following items: margaritas, chili con queso, or quesadillas

- 23 people had ordered none of these items.
- 11 people had ordered all three of these items.
- 29 people had ordered chili con queso or quesadillas but did not order margaritas.
- 41 people had ordered quesadillas.
- 46 people had ordered at least two of these items.
- 13 people had ordered margaritas and quesadillas but had not ordered chili con queso.
- 26 people had ordered margaritas and chili con queso.

3. A study was made of 200 students to determine what TV shows they watch.

- 22 students don't watch these cartoons.
- 73 students watch only Tiny Toons.
- 136 students watch Tiny Toons.
- 14 students watch only Animaniacs and Pinky & the Brain.
- 31 students watch only Tiny Toons and Pinky & the Brain.
- 63 students watch Animaniacs.
- 135 students do not watch Pinky & the Brain (for some completely incomprehensible reason).
- 9 students watch all three.

4. 150 people at a Van Halen concert were asked if they knew how to play piano, drums or guitar.

- 18 people could play none of these instruments.
- 10 people could play all three of these instruments.
- 77 people could play drums or guitar but could not play piano.
- 73 people could play guitar.
- 49 people could play at least two of these instruments.
- 13 people could play piano and guitar but could not play drums.
- 21 people could play piano and drums.

5. 100 people were asked if they knew who any of the following are: Loki, Hermes, and Ra.

- 25 people did not know any of these.
- 3 people knew all three.
- 48 people knew who Hermes or Ra were but did not know who Loki was.
- 40 people knew who Ra was.
- 21 people knew who at least two of these were.
- 7 people knew who Loki and Ra were but did not know who Hermes was.
- 8 people knew who Loki and Hermes were.

6. A study was made of 1000 rivers to determine what pollutants were in them.

- 177 rivers were clean
- 101 rivers were polluted only with crude oil
- 439 rivers were polluted with phosphates.
- 72 rivers were polluted with sulfur compound and crude oil, but not with phosphates.
- 289 rivers were polluted with phosphates, but not with crude oil.
- 463 rivers were polluted with sulfur compounds.
- 137 rivers were polluted with only phosphates.
- 82 rivers were polluted with all three.

7. 200 tennis players were asked which of these strokes they considered their weakest stroke(s): the serve, the backhand, the forehand.

- 20 players said none of these were their weakest stroke.
- 30 players said all three of these were their weakest stroke.
- 40 players said their serve and forehand were their weakest strokes.
- 40 players said that only their serve and backhand were their weakest strokes.
- 15 players said that their forehand but not their backhand was their weakest stroke.
- 52 players said that only their backhand was their weakest stroke.
- 115 players said their serve was their weakest stroke.

8. From a small town 120 persons were selected at random and asked the following question: Which of the three shampoos, A, B or C, do you use? The following results were obtained:

20 use A and C,	10 use A and B but not C,
15 use all three,	30 use only C,
35 use B but not C,	25 use B and C and
10 use none of the three.	

If a person is selected at random from this group, what is the probability that he or she uses

a. only A

b. only B

c. A and B

9. A veterinarian surveys 26 of his patrons. He discovers that 14 have dogs, 10 have cats, and 5 have fish. Four have dogs and cats, 3 have dogs and fish, and one has a cat and fish. If no one has all three kinds of pets, how many patrons have none of these pets?

10. In a certain Las Vegas Casino, a survey of 125 gamblers was taken and the following data were collected:

71 gamblers played roulette	72 gamblers played poker
80 gamblers played blackjack	33 gamblers played roulette and poker
42 gamblers played roulette and blackjack	47 gamblers played poker and blackjack
11 gamblers played all three.	

a. How many of these gamblers played only blackjack?

b. How many played poker and blackjack but not roulette?

c. How many played at least one of these games?

d. How many did not play poker?

e. How many played poker and roulette?

11. At a subway stop in New York City, 125 people were asked what newspaper they read.

46 people read the Times,	43 people read the Post, and
65 people read the News.	19 people read the Times and the Post,
18 people read the Post and the News,	11 people read the Times and the News.
7 people read all three papers.	

a. How many people read only the News?

b. How many people did not read any of the papers?

c. How many people read the Post and the News, but not the Times?

d. How many people read both the Times and the Post?

e. How many people did not read the Times?

12. A guidance counselor is planning schedules for 30 students. Sixteen students say they want to take French, 16 want to take Spanish, and 11 want to take Latin. Five say they want to take both French and Latin, and of these, 3 wanted to take Spanish as well. Five want only Latin, and 8 want only Spanish. How many students want French only?

13. In a survey of children who saw three different shows at Walt Disney World, the following information was gathered:

- 39 children liked *The Little Mermaid*
- 43 children liked *101 Dalmatians*
- 56 children liked *Mickey Mouse*
- 7 children liked *The Little Mermaid* and *101 Dalmatians*
- 10 children liked *The Little Mermaid* and *Mickey Mouse*
- 16 children liked *101 Dalmatians* and *Mickey Mouse*
- 4 children liked *The Little Mermaid*, *101 Dalmatians*, and *Mickey Mouse*
- 6 children did not like any of the shows

a. How many students were surveyed?

b. How many liked *The Little Mermaid* only?

c. How many liked *101 Dalmatians* only?

d. How many liked *Mickey Mouse* only?

14. In a certain hospital, the following data on patients were recorded:

25 patients had the A antigen	30 had the Rh antigen
17 had the A and the B antigen	12 had none of the antigens
27 had the B antigen	16 had the A and Rh antigen
22 had the B and Rh antigens	15 had all three antigens

a. How many patients are represented here?

b. have exactly one antigen?

c. have exactly two antigens?

15. A survey of 80 sophomores at a certain western college showed the following:

36 take English	32 take history
32 take political science	16 take history and English
16 take political science and history	14 take political science and English
6 take all three	

a. How many students take English and neither of the other two?

b. Take none of the three courses?

c. take history, but neither of the other two?

d. take political science and history but not English?

e. do not take political science?

16. The following list shows the preference of 102 people at a wine-tasting party:

99 like Spanada	94 like Ripple and Boone's
96 like Ripple	96 like Spanasa and Boone's
99 like Boone's Farm Apple Wine	93 like all three
95 like Spanada and Ripple	

a. How many people prefer none of the three?

b. Spanada, but not Ripple?

c. anything but Boone's Farm?

d. exactly two kinds of wine?

17. A chicken farmer surveyed his flock with the following results. The farmer has:

9 fat red roosters (male)	37 fat chickens	6 thin red roosters	2 fat red hens
7 thin brown hens	5 thin red hens	26 fat roosters (total)	18 thin brown roosters

Answer the following questions about the flock. (HINT: in your Venn diagram make a circle for fat, for male and for red). How many chickens are:

- a. fat?
- b. red?
- c. male?
- d. fat, but not male?
- e. brown, but not fat?
- f. red and fat?

18. Country-Western songs emphasize three basic themes: love, prison and trucks. A survey of the local Country-Western radio station produced the following data:

12 songs about a truck driver who is in love while in prison
2 about people in prison who are not in love and do not drive trucks
8 about people who are out of prison, are not in love, and do not drive a truck
13 about a prisoner in love
28 about a person in love
18 about a truck driver in love
16 about truck drivers who are not in prison
3 about a truck driver in prison who is not in love

- a. How many songs were surveyed?
- b. truck drivers?
- c. prisoners?
- d. truck drivers in prison?
- e. people not in prison?
- f. people not in love?